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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/918,474 | 08/01/2001 | Karl T. Chuang | 11157-33 | 3100 |

7590 11/05/2003

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| EXAMINER |
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PRICE, ELVIS O

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| ART UNIT | PAPER NUMBER |
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1621

DATE MAILED: 11/05/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/918,474

Applicant(s)

CHUANG ET AL.

Examiner

Elvis O. Price

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 30-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 12,13 and 30-39 is/are allowed.
- 6) ☒ Claim(s) 1, 4-8, 10 and 11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Claims 1-13 and 30-39 are pending in the application.
2. Applicants' amendment, filed 6/3/03, has overcome the 35 USC 112, second paragraph rejection issued in the office action dated 3/3/03.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4-8, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith, Jr. et al. {US Pat. 4,982,022}, in view of Perry's Chemical Engineer's Handbook (7th Ed. Pp. 7-20, 7-25 to 7-28, and 23-45).

Applicants claim a process for the production of alcohols, comprising

(a) subjecting an olefin to a hydration reaction with water to form a reaction product including the corresponding alcohol, the olefin having a carbon chain of 2 to 12 carbon atoms, the carbon chain being selected from a linear chain and a branched chain, the reaction being conducted in the presence of a solid state olefin hydration catalyst, the temperature and the pressure of the hydration reaction being selected so that the olefin is largely in a vapour phase and the alcohol is in the liquid phase, the olefin being in a molar excess when compared with water; and (b) recovering a product stream containing alcohol and volatile components from step (a) and subjecting the product stream to heating and returning the volatile components to step (a) for further

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processing; and (c) simultaneously recovering the alcohol as a substantially anhydrous liquid.

Smith, Jr. et al. teach a process for the production of an alcohol (tertiary butyl alcohol), via catalytic distillation, and the simultaneous recovery of the said alcohol as a substantially anhydrous liquid comprising, subjecting an olefin (isobutene; 4 carbon atoms; bp = -6.9°C) to a hydration reaction with water to form a reaction product including the corresponding alcohol (tertiary butyl alcohol; bp = 82°C) in the presence of a solid state olefin hydration catalyst (acid cation exchange resin: amberlyst 15). (see Example 2 and Table III). The hydration reaction is carried out at temperatures and pressures such that the olefin is in the vapour phase and the alcohol is in the liquid phase (see the standard process in Table III: Catalyst zone temp. is 165°F which equals 74°C). Smith, Jr. et al. teach that the reaction temperature is from 120° to 300°F (49° to 149°C) and the pressure is from 15 psig to 300 psig (0.1 MPa to 2 MPa) (see Col. 3, lines 56-62). The difference between the presently claimed invention and what is taught by the Smith, Jr. et al. reference is that the Smith, Jr. et al. reference is silent about the olefin being in molar excess when compared with water and does not teach the presently claimed recovery step (b). However, Smith, Jr. et al. teach that the amount of water must be controlled because too much water will cause the product alcohol to contain water and also decrease the reaction rate relative to the amount of excess water (see Col. 2, lines 13-20). Additionally, the presently claimed recovery step (b) is a recycling step, which merely removes volatile components from the product stream before returning them to the first process step. Recycling process steps are

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steps, which are obvious to one having ordinary skill in the art desiring to minimize process cost and optimize reaction conditions (see pages 7-20, 7-25 to 7-28 and 23-45 of the 7th Edition of Perry's Chemical Engineer's Handbook).

It would have been *prima facie* obvious to one having ordinary skill in the art, at the time the invention was made, to produce alcohols as presently claimed because Smith, Jr. et al. teach a process for the production of an alcohol (tertiary butyl alcohol), via catalytic distillation, and the simultaneous recovery of the said alcohol as a substantially anhydrous liquid comprising, subjecting an olefin (isobutene; 4 carbon atoms) to a hydration reaction with water to form a reaction product including the corresponding alcohol (tertiary butyl alcohol) in the presence of a solid state olefin hydration catalyst (acid cation exchange resin: amberlyst 15). (see Example 2 and Table III).

One having ordinary skill in the art, desiring to obtain the optimum results (increased conversion of reactants, yield, selectivity and purity of the desired product(s)) from the Smith, Jr. et al. process of producing alcohols, would have been motivated to decrease the amount of the water used in the hydration reaction (1:1 or less than a 1:1 molar ratio of water to olefin) so as to eliminate water from the product alcohol(s) while increasing the reaction rate. Additionally, one having ordinary skill in the art would have been motivated to separate and recycle volatile components from the product stream so as to afford a more economical process. Therefore, the instantly claimed invention would have been obvious to one having ordinary skill in the art.

Allowable Subject Matter

Claims 2, 3, 9, are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The subject matter of claim 2 is unobvious over the prior art of record because the prior art of record does not teach or suggest a process for producing alcohols, as presently claimed, wherein a catalyst with hydrophobic properties is used in the hydration reaction.

The following is a statement of reasons for the indication of allowable subject matter: Claims 12, 13, and 30-39 are unobvious over the prior art of record because the prior art or record does not teach or suggest a process for producing alcohols, as presently claimed, wherein a solid phase hydrophobic olefin hydration catalyst is disposed within the hydration column in two separate spaced apart catalytic beds.

Response to Arguments

Applicants' arguments, filed 6/3/03, have been fully considered but they are not persuasive.

Applicants argue that their modification of claim 1, the inclusion of recovery step (b) now renders claim 1 unobvious over Smith, Jr. et al. because the liquid phase of the presently claimed process has a much higher alcohol content than that of Smith, Jr. et al. and the amount of alkene dissolved in the liquid phase is higher and this increases the concentration of alkene at catalyst sites to a higher level than in Smith, Jr. et al.

This argument is not convincing because applicants' presently claimed recovery step (b), is a process modification that would be obvious to one having ordinary skill in

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the art. Applicants are merely removing volatile components from the product stream, by heating, and recycling the said volatile components to the initial reaction process steps. Such a recovery step would be obvious to a person having ordinary skill in the art, desiring to isolate/purify the reaction product stream from volatile components and then recycle the volatile components in order to affect an optimum and economical process.

Applicants argument, with regard to the presently claimed invention having a much higher alcohol content and a higher concentration level of alkene at catalyst sites than in the Smith, Jr. et al. process is also not convincing because applicants claim language is not limited to any amount and/or concentration of alcohol and/or produced alkene.

Applicants' amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

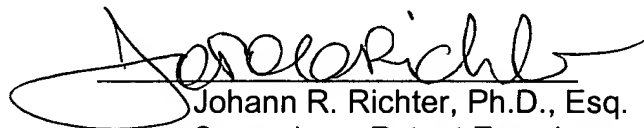
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elvis O. Price whose telephone number is 703 605-1204. The examiner can normally be reached on 8:30 am to 5:00 pm; Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Johann R. Richter can be reached on 703 308-4532. The fax phone numbers for the organization where this application or proceeding is assigned is 703 308-4556 for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-1235.

Elvis O. Price

October 15, 2003


Johann R. Richter, Ph.D., Esq.
Supervisory Patent Examiner
Technology Center 1600